

Our Mississippi



US Army Corps
of Engineers.

PARTNERING TO KEEP
AMERICA'S RIVER GREAT

MISSISSIPPI VALLEY DIVISION • FALL 2025

Tiny bird makes a big comeback

New islands aiming to recreate the historic Mississippi River habitat of the world's tiniest tern have been met with a hearty welcome from the flock.

The cover photo of the Interior Least Terns was shot by Joel Sartore as part of The Photo Ark project. Sartore set out to shoot portraits of the earth's 25,000 animal species (he's at 13,000) before they vanish. He asked: "How can I get people to care that we could lose half of all species by the turn of the next century?" SEE MORE AT JOELSARTORE.COM/PHOTO-ARK

IT'S NOT EASY TO FIND A NEST that resembles the gentle indentation in sand that a baseball might make if you tossed it in the air and it landed softly in the river's sandbar. Nor can even trained biologists sometimes spot the tiny eggs of the Interior Least Tern, eggs camouflaged with dots resembling grains of sand.

But when Justin Garrett visited a new ecosystem restoration project—one still covered in construction equipment it was so new—he knew something was up by a more obvious sign. Dozens of tiny birds were zipping around his head to scare him away from what he knew must be nearby nests on a sandbar being built from sediment dredged from the river channel.

What the regional environmental planning chief found within just 15 minutes on new Canvasback Island was a dozen nests of the Interior Least Tern, a species long threatened and only recently taken off the endangered species list. He saw that as one sign among many that U.S. Army Corps of Engineers efforts to restore the population was making a difference.

"I had never seen that many nesting pairs at once," he said. "It was encouraging to see."

The comeback story

The numbers of this world's tiniest tern declined starting in the late 19th and early 20th centuries. The sweet bird known by its distinctive yellow beak, jerky wing motions and precision dive work was also known for lovely feathers in hot demand for women's hats. That started the species decline, one quickly exacerbated by engineering measures to control major rivers like the Missouri and Mississippi. The structures wiped out the natural sandbars that made up the bird's shoreline habitat.



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Canvasback Island, eight miles from Alton, was created by dredged material to mimic the original sandbar islands of the Mississippi and provide habitat for wild life like the Interior Least Tern. **BELOW, FROM LEFT:** The islands, situated on this map, were designed to last at least 50 years and, when above water, to provide bird nesting areas and also benefits to fish, wildlife and boating access. Terns responded quickly, nesting on the new island for three consecutive years. Partners banded the baby terns to test the islands' nesting success.



By 1985, there were as few as 1,400 of the birds in existence, placing it on the Endangered Species Act list. By 2021, the population had bloomed to 18,000, enough to remove the tern from the act's protection.

That doesn't mean federal agencies have given up caring—or helping. The U.S. Army Corps of Engineers has pledged to manage the river in a way to keep the population thriving, continuing its role in what's been called the most exciting comeback story on the Mississippi.

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One of the Corps' most inventive solutions started well over a decade ago at the Riverlands Migratory Bird Sanctuary, where Garrett worked at the time. In partnership with the Illinois Department of Natural Resources and the Natural History Survey, Riverlands staff took two barges anchored off the Mississippi and turned them into a nesting habitat for terns. They covered the barge base with a mixture of sand and gravel, added driftwood for shelter, then broadcast recordings of tern calls. It worked.

Within two weeks, Interior Least Terns were landing on the barge, soon after building nests. The first year, the island drew as many as 36 of the endangered birds, and the populations of this "colony" bird that returns to the same nesting ground each year grew from there. Seeking a more natural solution, the staff eventually lured terns to sandbars on an on-site pond.

Compounding benefits was a partnership between the Army Corps and the U.S. Fish and Wildlife Service to reconnect the main channel with backwaters. They put notches in dikes and created more sandbar habitats, benefiting this bird as well as endangered critters like the pallid sturgeon and fat pocketbook mussel. Maj. Gen. Diana Holland—a past commander of the Mississippi Valley Division—called the tern comeback evidence the Corps can successfully multi-manage a great river, providing critical navigation and flood control benefits while also protecting and recovering an endangered species,

At home on Canvasback Island

The newest contributor to the long-term survival of the species is a \$7.2 million project, funded through the Upper Mississippi River Restoration program, that's creating multiple new islands near St. Louis for multiple habitat benefits. The new islands, part of the Piasa and Eagles Nest Island Habitat Rehabilitation and Enhancement Project, are seeking to bring back part of an island mosaic present prior to the creation of Lock and Dam 26. Locks and dams and other river training structures that enhanced navigation locked the river in place and no longer allowed the natural meandering that created new islands and sandbars.

Dredged sediment from the side channel and backwater enhancement was placed inside rock rings surrounding Piasa Islands, and nature takes it from there.

A Corps outreach team worked with area students to name the islands, and students won with nominees Steamboat, Moonlight and Canvasback—the island particularly attractive to the least tern because it was kept intentionally sparse to provide the sandbar habitat this critter and a variety of turtles and other wildlife prefers. Just a few pieces of driftwood were added as spots for fledglings to escape predators.

The birds that greeted Garrett on his visit were a pretty clear sign of immediate success, but crews from the U.S. Army Corps of Engineers, the Audubon Society, Illinois Department of Natural Resources and World Bird Sanctuary are making visits also to band the new chicks. This will show more definitively if they're settling into the new territory and making it home, says Tyler Goble, lead wildlife biologist with the Corps' St. Louis District's Rivers Project Office. On their first Canvasback outing in late July, teams caught and banded just two, but found many others at that point too young to handle. But monitoring, banding and habitat creation work will continue, Goble said, as the Army Corps seeks increasingly to use infrastructure for multiple uses.

"We need these locks and dams on the river for navigation and other uses that have negative impacts on some ecosystems and habitat types. But we're realizing we have tools in our toolbox we can use to do good. We need to dredge to keep the navigation channel open. Instead of side casting it and throwing it in the river, we can cast it intentionally to build sandbars and islands."

The tern remains a focal species of concern, and "we'll continue to improve and increase habitat for them," he said. "It's not like you walk away because you've restored something. They will still need constant help from humans." —K.S.



Underwater Warriors

It's not a job for everyone, spending days submerged in cold water with powerful currents and limited visibility. But the job the U.S. Army Corps of Engineers St. Paul District dive team takes on routinely is critical to navigation on the Mississippi River.

Nine divers, including one trainee, make up the team. Their primary task is underwater inspection, maintenance, and repair of the Corps lock and dam system on the Mississippi and its headwater reservoirs, dive coordinator Kraig Berberich explains. The only full-time team member, he schedules

water level in the lock. The cotter pins at the base of each diagonal are especially vulnerable to corrosion and damage so each one must be inspected.

It is meticulous work, and divers must learn the structure by feel.

"Every single nut gets eyes on it or a wrench on it," says Ryan Markey who serves as standby diver on this day. As standby diver, Markey wears the dry suit and gear needed to rescue the diver if there is an emergency in the water.

Kevin Lakey acts as tender, attentively watching Berberich, who is this day's diver. Lakey manages the brightly colored umbilical cord that supplies breathing air, air pressure, and communications from the surface to the diver. The umbilical can also supply externally powered lights and camera when needed.

Assisted by Lakey and Markey, Berberich dons the 30-pound "hat" (as the diver's head gear is called) and rolls off the boat, disappearing into the murky water. The floating umbilical and a thin stream of bubbles mark his progress along the algae-covered lock walls and across the face of the miter gate. In addition to checking the fasteners on the miter gate, he looks for corrosion at vulnerable joints and inspects the bubbler system that keeps ice and debris off the lock wall.

Over the course of the afternoon, Berberich finds a damaged bubbler jet that needs to be replaced and a corroded cotter pin on a miter gate diagonal. While replacement parts are available, VanLoon decides the cotter pin repair needs to be deferred. It's too late in the afternoon to start a job that might take 15 minutes or 3 hours.

Another task awaits the team the following day as well—replacement of a damaged trash rack, a large metal screen that keeps debris out of the lock. The team will use their newly acquired certification in underwater cutting and welding to install a new rack.

Other projects awaiting the team this year include setting new miter gates in place at Lock and Dams 6 and 7, a bridge inspection, and a survey for endangered mussel species near the confluence of the Mississippi and Minnesota rivers. The dive team is on assignment about 24 weeks annually over the course of five or six months.

The St. Paul District team's reputation puts them in demand beyond their home territory, says Tabery, a former St. Paul diver, supervisor, and dive coordinator himself. "Among the 13 dive teams in the Corps, the Saint Paul team is one of the best in the country." —D.D.

the team's work within the St. Paul District and on special projects from Alaska to New Orleans. The other team members are lock operators with a collateral duty assignment as divers.

The team's work at Lock and Dam 3 near Red Wing on this early June day typifies many of their assignments. Work starts in the control room with a safety meeting with Lockmaster Tim Tabery, his crew, and today's 4-person dive team. They review the day's work, any special conditions at this location and safety procedures.

"Diving is one of the most dangerous jobs in the Corps," Berberich reminds the group. "Safety first."

A major safety measure is handing the key to all the electronics in the lock and dam over to the dive supervisor to prevent accidental lock operation while divers are in the water. No one wants to risk a shift change in which the new staff doesn't even know the divers are there, dive supervisor Nathan Vanloon explains.

The dive supervisor also manages the systems that supply air and communications to the diver, drives the boat and directs operations. The supervisor also assesses hazards and operational situations and can say no to any aspect of the job.

One of the hazards Vanloon is on the lookout for this day is "differential pressure" in the lock chamber, something that creates a risk of a diver being pinned against or sucked into a lock's miter gate. "We try to mitigate external water trying to get in by equalizing water in the lock," he said.

The team has been assigned to inspect the miter gate diagonals, the large structural members that reinforce the gates that open and close to control the



DID YOU KNOW?

Retired Central Area Lockmaster Wally Voss set the foundation for the St. Paul District's dive program in the mid-1960s. After serving as a diver in the U.S. Navy, Voss applied his skills at Lock and Dam 5 in Minnesota City, Minnesota. He played a pivotal role in organizing the District's diving team, serving as a diver, dive supervisor and dive coordinator for more than 25 years. Voss retired in December 1988, but his legacy continues.



COMMANDER PROMOTED

Maj. Gen. Kimberly A. Peebles, commander of the Mississippi Valley Division (MVD) was promoted July 31, making her the U.S. Army's newest major general. Peebles assumed command of the division in July 2023 making her the senior military officer of the Mississippi Valley Division, which is responsible for water resources and engineering solutions in a 370,000 square mile area that extends from Canada to the Gulf of Mexico and encompasses 12 states. Maj. Gen. Peebles is a 30-year Army veteran and has previously commanded the U.S. Army Corps of Engineers Lakes and Rivers Division. Maj. Gen. Kimberly M. Colloton presided over the promotion ceremony.



Managing the Mississippi *Can a regional compact protect the mighty but vulnerable Mississippi River?*

As the thirsty West grapples with water shortages that may get even worse, some of its leaders are eyeing the Mississippi as a potential new source—and that worries those close to the river who already depend on it for drinking water and much more.

A coalition of cities on the Mississippi, that vital artery coursing through the nation's heartland, and other organizations are pushing for a multi-state compact that would prevent significant volumes of the river's water from being piped elsewhere. That is but one hazard confronting the Mississippi, which the advocacy group American Rivers ranks as the most endangered in the U.S. Among other perils are droughts, floods, saltwater intrusion near the Gulf, and pollution from farms and factories.

"The Mississippi River and the watershed are under threat," said Alexandra Campbell-Ferrari, executive director of the Center for Water Security and Cooperation, a nonprofit water law research institution based in Washington, D.C.

A regional compact, she said, would ensure that "the water resource is there to protect our lives and livelihoods. Without that law, communities are not working together, we don't have the same shared vision, and we lose sight of what we need for the water resources to thrive through goods, services and recreational opportunities."

States along the Mississippi recognize the needs of more arid parts of the country, said Colin Wellenkamp, executive director of the cities and towns initiative and a Missouri state representative. "But we don't think the answer is compromising one watershed to help another."

The Great Lakes, the Colorado and Delaware rivers, and numerous other major waterways are protected by compacts, which are complex and take years to negotiate. The U.S. Constitution allows states to make such agreements with each other. They have the force of federal law once approved by Congress and signed by the president, said Christopher Dalbom, director of Tulane University's Institute on Water Resources Law and Policy. Interstate compacts usually involve protecting a waterway's quality—avoiding pollution—or quantity, which means ensuring the resource doesn't run too low and is fairly shared between different users.

"The Mississippi is such an important resource for so much of the country, yet approximately zero management of it is happening at a basin scale, or even at the main-stem scale," Dalbom said. "Being an unmanaged resource makes it hard to plan for it and depend on it."

Ten states directly adjoin the river: Minnesota, Wisconsin, Iowa, Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi and Louisiana. But 21 others are within the watershed draining into the river.

Data compiled by the U.S. Fish and Wildlife Service a decade ago found that the Mississippi generates more than \$400 billion in annual economic output and supports 1.3 million jobs. More than 50 cities with a combined population

of 20 million draw their drinking water from the river, which is also essential for many types of wildlife. The Audubon Society estimates that some 325 bird species use the Mississippi corridor for migration, relying on healthy stopover spots along the way.

Systematic diversion of Mississippi water outside the drainage basin could cause significant harm, experts say. Periodic droughts already cause low flows that hamper cargo barge traffic; removing water could make such interruptions more frequent and severe. Reduced flows could enable more saltwater to pollute drinking water in the lower river while impeding the southerly movement of needed sediments. Water levels and flow rates are of concern to the U.S. Army Corps of Engineers, which oversees dams that prevent flooding and dredges sediment in areas where low water inhibits commercial barge traffic.

While not involved in the compact discussions, the Corps has led discussion of watershed management and is conducting a five-year study of the southern portion of the river to develop strategies for a range of purposes including water supply and flood control.

It would be up to state legislators and governors to negotiate the compact, but support from cities and tribes could help build momentum. Seventy-nine federally recognized tribes are based within the Mississippi watershed. Mayors attending the cities and towns initiative's annual meeting in 2023 voted unanimously to work toward a compact. This fall, the group will discuss what that compact might say.

A potential model is a law enacted by Missouri this year, Wellenkamp said. It requires a permit to export large volumes of the state's water elsewhere and says any diverted water must be used within 30 miles of the state line. At least initially, the compact likely would focus on water quantity—safeguarding it from being piped outside the watershed and making sure all users get their fair share, Wellenkamp said.

The Great Lakes region adopted its quantity-focused compact in 2008 after roughly a decade of bargaining. Its eight states were spurred by fears that their water would be piped or shipped to arid regions of the U.S. or other countries. States along the Mississippi have the same concerns, Wellenkamp said.

Western states that rely on the Colorado River, which has fallen steadily as the region has experienced severe drought for a quarter-century, have spoken of piping water from the Mississippi. Arizona enacted a law several years ago to investigate the possibility. In Kansas, some leaders have proposed diverting water from the Missouri River as the giant Ogallala aquifer, which has long supplied Plains states with groundwater, diminishes.

"Water resources in the West continue to dwindle and there doesn't seem to be a lot of interest there in large-scale conservation measures," Wellenkamp said. "It's more about 'where do we get more water.' We want to make sure we can keep ours." J.F.

Mussel Love Match

ERDC researcher identifies new host fish for a rare Mississippi mussel



DR. DAVID RUPPEL found himself fascinated by tales of the way the once crystal-clear Lower Mississippi River was filled with bottomland forest and deep enough for vessels to traverse waterways with loads of timber and cotton. Today, agriculture land has cut right to the edges of these not-now-so-clear streams.

The researcher at the U.S. Army Engineer Research and Development Center in Vicksburg, Mississippi, says he understands the importance of agriculture to the region, but he also found himself wondering if more couldn't be done to help rare species like mussels still found here but seriously imperiled. His curiosity was further piqued when realizing that while certain rare mussels were found in lower rivers, there was no evidence of the fish essential for their survival.

Fish and mussels have an unusually symbiotic relationship. Mussels are masters of the art of deception, waving lures that mimic prey fish. When a host fish tries to snatch it, the mussel releases its parasitic larvae, and that attaches to the fish's gills. When the tiny mussels mature, they drop off and settle in the riverbed. The mussels get a free ride, and the fish get water made cleaner by their mussel companion.

This symbiosis is very particular. For example, the Winged Mapleleaf mussel relies on the Channel Catfish, whereas the Black Sandshell on Walleye and Largemouth Bass, and the Rabbitsfoot on the Blacktail Shiner.

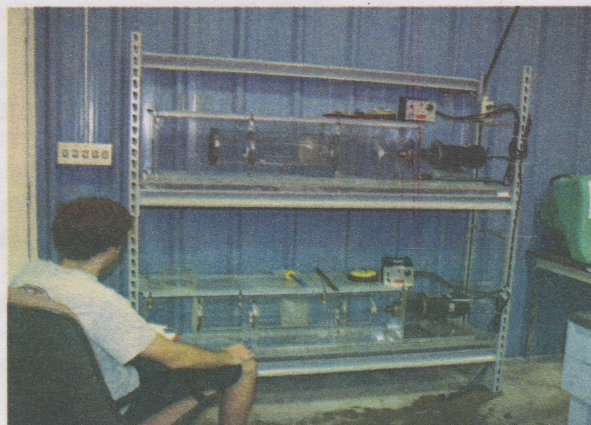
The Big Black River has the only population of the Round Hickorynut mussel left in Mississippi, he said, and here's the quandary. Its only known host fish found in that system, the Blackside Darter, is in very small numbers and not near the largest populations of the mussel. Dr. Ruppel set out to see if researchers were perhaps missing another potential host fish. Could there be a similar "darter" that could be a love match with this mussel?

The team collected nine potential species with similar traits found within the Big Black River. His team, partnering with a U.S. Fish and Wildlife office, extracted larvae from five Round Hickorynut mussels and infected each fish a subset of the larvae. They placed each fish in an individual container as part of a circulating Aquatic Habitat system to monitor juvenile drop offs. Over the course of several weeks of testing the fish and mussels in a laboratory they found three confirmed host fish that exist in the Big Black River and are not on any host fish list Dr. Ruppel had found.

The research is part of a study called "an assessment of host fish relationships for flow requirements for fish passage." As part of this, a colleague of Dr. Ruppel is "swimming" more than 50 fish closely related to preexisting known host fish of the federally endangered or threatened Rabbitsfoot and Sheepsnose mussels and the Round Hickorynut, which is these species most southern population. Future fish passage systems, if developed, could be used from the swim study data to ensure the project allowed for successful passage of these key species.

"This is more a proof of a concept type thing," he said. "If we can figure out what the host fish are within our given systems for these threatened and endangered species, we can provide relevant biological information to districts doing the projects. That can aid in the recovery of these species while successfully completing the USACE mission." —K.S.

FROM TOP: Freshwater mussels use their mantle, a fleshy tissue that lines their shell, to create lures that mimic prey items to attract fish. The lures resemble minnows, insects or small creatures to entice fish to get close, and when a fish strikes the lure, the mussel releases larvae and it attaches to the fish's gills, using the fish as host. Researchers are testing fish and mussel pairings at the Corps' Engineer Research and Development Center in Vicksburg.



Sabrina Chandler, 44, refuge manager, Upper Mississippi River National Wildlife and Fish Refuge (261 river miles and more than 240,000 acres)

"Growing up on the Mississippi Gulf Coast, I have always had an affinity to large rivers because they can seem so wild, even when they co-exist in and along large population centers. Because of my connection to the river, I like to connect people to the river's wild side.

"Most people only see the river as a transportation system or an opportunity for a sunset cruise, but there is so much more, and here on the Upper Miss, the refuge has a lot to do with that. Working with our volunteers, friends groups and partners, we get people out on the river in kayaks and canoes or even in an outdoor classroom to learn more and develop an appreciation for the river. We help visitors and the general public see how this stretch of the refuge and the river contribute to wildlife, fish, and their habitats.

"There are people here who grew up in communities along the river—places like La Crosse, Winona and the Quad Cities—who see the river, who know the river is there but never go out on a boat or fish or spend time on the beach. They don't realize these opportunities exist because of the creation of the refuge. It's kept these areas from being developed.

"In the Upper Mississippi, we educate our visitors on the importance of the refuge to waterfowl migration; there is a significant population of Tundra swans and Canvasbacks who migrate through here; they depend on the refuge and the habitat to fuel them on their way. We take people out and let them see all the critters the river supports, whether it's snakes, spiders or other creepy critters. Once I was out with a group of students and a huge bull snake crossed our paths — they squealed and went crazy. We've even had snakes fall out of trees onto boats during VIP site visits. People may scream, but it's an opportunity to help them understand what the snake is doing here and why it is important to the ecosystem.

"Another priority is to protect and restore the floodplain forests. Because of varying water levels, there is significant impact on the floodplain forest, resulting in die-offs. It's hard to control water levels but we have benefitted from funding through the Upper Mississippi River Restoration program and we also tap into the partnership for additional expertise in this area. Forest restoration also gives us opportunities to improve fisheries when we dredge backwaters to elevate islands and areas where trees are planted. We are so fortunate to have national wildlife refuges, and I am very partial to the ones on the river."



Dredge Potter keeps river traffic rolling

There's a subtle rumble from the pilot house of the *Dredge Potter*. These are the vibrations caused by the churning, and how it churns. Tons of river-bottom sediment is removed or displaced daily to keep navigation freely flowing. Increasingly, dredged material is also used to create island habitat to help wildlife make the river their home.

"After a week you get used to the vibrations. I sleep like a baby," said Brian Ragsdale, the dredge master. "When the pump stops running almost everybody wakes up because it is so quiet."

This day, the *Potter* with its 55-man civilian crew is anchored on the Mississippi River below Grafton, Illinois. There, the Illinois River has just dropped its share of the silt, sand, clay and gravel that maintain the Mississippi's reputation as the "Big Muddy."

There's a simple explanation for all that "mud." The Mississippi watershed stretches from the Rocky Mountains to southwestern New York state. Each spring's snowmelt and seasonal rains flush debris downstream. Inestimable tons of it drop out of the water column before reaching the coast. As the river slows and water levels drop through the summer, sediment dropping to the bottom of shipping channels can hinder passage of towboats and barges.

That, experts say, would be very harmful for the nation's economy. Each year the Mississippi moves 578 million tons of cargo and supports about one million jobs and \$345 billion in economic activity. Manufacturing industries account for more than 80 percent of that of cargo, including 60 percent of the country's corn and soybean exports.

"At most of our dredging locations, we're taking three feet of material out," said Lance Engel, dredging project manager for the St. Louis District of the U.S. Army Corps of Engineers. "Some areas that have slack water can be worse. We dredge a port near Cape Girardeau that will have nine or ten feet of material to come out. At the St. Louis harbor we've had ten feet to take out."

In recent years an average of 9.3 million cubic yards of sediment have been

dredged from the Upper Mississippi. Around 6.6 million cubic yards of that are removed in the Corps' St. Louis District. It maintains navigation channels on the lower 80 miles of the Illinois River and on 300 miles of the Mississippi from Cairo, Illinois, to Saverton, Missouri.

The District's primary tool for channel maintenance is the *Potter*, and at 94 years it is one of the oldest vessels on the river.

Potter's construction began in 1931, a year after the U.S. Congress ordered the Corps of Engineers to maintain nine-foot-deep shipping channels. First a steam-powered paddle-wheeler, *Potter* went to the Memphis District in 1932 then was transferred to St. Louis in 1979.

The *Potter* is a dustpan dredge. That means it vacuums sediment, gravel and water through a pan that is 32 feet wide and two feet tall and can work from seven to 32 feet under water. Engel says the *Potter* can dredge 3,000 cubic yards of material per hour, which is roughly the size of an Olympic-size swimming pool full of sand. At 2,700 pounds per cubic yard, that's more than eight million pounds of sand.

The Corps also operates the dustpan dredges *Jadwin* in the Vicksburg District and *Hurley* in the Memphis District. The St. Paul District's *Goetz* is a cutterhead dredge that loosens debris with a rotating auger. Contracted dredges pitch in as well, with dredges traveling among districts as needed.

For its 70th anniversary, the *Potter* got a special gift. It was repowered with diesel engines and substantially renovated in 2001. The boilers, steam engine and paddle wheels were replaced by three Caterpillar diesel generators and two 84-inch propellers. Electric propulsion and pump motors and a water purification system were installed, as were a new stern and a larger pilot house fitted with computerized control systems.

"I started working for the Corps right before *Potter* was repowered," Engel said. "It still had the old sound tubes for the pilot to talk to the engine room. The pilot house felt like a closet."



TOP ROW, FROM LEFT: This derrick can lower Potter's dustpan up to 32 feet under water to vacuum sediment from the river bottom; Dredged material is sprayed from the baffle house up to 600 gallons per minute and deposited outside the navigation channel. Here the material is forming sandbars, one example of the Corps' beneficial use of dredged sediment used to improve the ecosystem. Second mate Dave Seger. Lance Engle, dredging project manager for the St. Louis District of the U.S. Army Corps of Engineers. Chief Steward Joshua Smith stands in the galley that prepares four meals a day. SECOND ROW FROM LEFT: Looking back at Potter from the baffle shack, at the end of an 832-foot pontoon pipeline, as a towboat pushes a string of barges downstream. The M/V Kimmswick, tied beside Potter, and M/V Prairie du Rocher support the dredge as it works on the river.

The Potter can dredge 3,000 cubic yards of material per hour, which is roughly the size of an Olympic-size swimming pool full of sand. At 2,700 pounds per cubic yard, that's more than eight million pounds of sand.

Life on board

"Every watch is different. It never gets boring," said Second Mate Dave Seger as he monitors the propulsion controls.

The mate works in tandem with a crewman who operates two electric winches. Each holds 5,000 feet of steel cable that are extended far in front of the dredge, crossed and anchored. With the anchors in place, the winches and propellers slowly pull Potter upstream, averaging 600 feet an hour. A 500-horsepower jet pump sprays water through 20 nozzles on the leading edge of the dustpan to stir sediment before it is vacuumed and propelled through the boat to a pipeline attached to the stern.

Dredging locations are identified by the Corps' patrol boat M/V *Pathfinder* during reconnaissance surveys. At each assignment, Potter is placed precisely over global positioning satellite (GPS) maps displayed on computer screens. The monitors track the dredge's direction and dustpan depth.

"It gets interesting sometimes," said Seger, a 45-year Corps employee. "It depends on what kind of material we are in. If it is trashy or has a bunch of rock, it can be pretty tiring."

At the end of each cut, Potter is backed downstream and realigned for a parallel cut.

The electrical room

The electrician on duty monitors the diesel engines, propulsion and sediment pump motors and other electrical systems through computer displays. Operating parameters, such as engine oil pressures and electric motor bearing temperatures, are displayed continually. A click of the mouse controls any system.

Potter is staffed by three shifts of 17-man crews. Two shifts are on board at a time, with most crewmen bunking in a private room. The galley serves meals at breakfast, lunch, dinner and midnight. Shifts change at 6 a.m. and 6 p.m., and Ragsdale prefers 12-hour shifts to the six-hour rotations on commercial towboats.

"You do your laundry, eat dinner, take a shower and still get eight hours of sleep."

Dredging for the environment

The *Potter* and the city of Grafton appear as specks for deckhands staffing the "baffle shack" at the end of the 832-foot pontoon pipeline floating on barges. *Potter*'s 2,400-horsepower electric pump pushes material through the 32-inch steel pipe at about 600 gallons per minute. Using the force of the discharge, deckhands position the pipeline and direct the spray through a manually turned baffle.

Potter can be attached to a 3,200-foot self-floating pipeline when greater distance or flexibility is needed.

Open sections of the river are wide enough for sediment to be placed outside the main channel, Engel said. Where the river is constricted, sediment must be deposited on land or removed on barges to available sites.

Sediment removal can benefit wildlife as well as navigation. On this day *Potter* is building sandbars.

Outside of the open river, "USACE has a goal of 70-percent beneficial use of dredge material," Engel said. "Open water placement is not considered in that calculation, but it can be used beneficially for island building, habitation creation or construction fill."

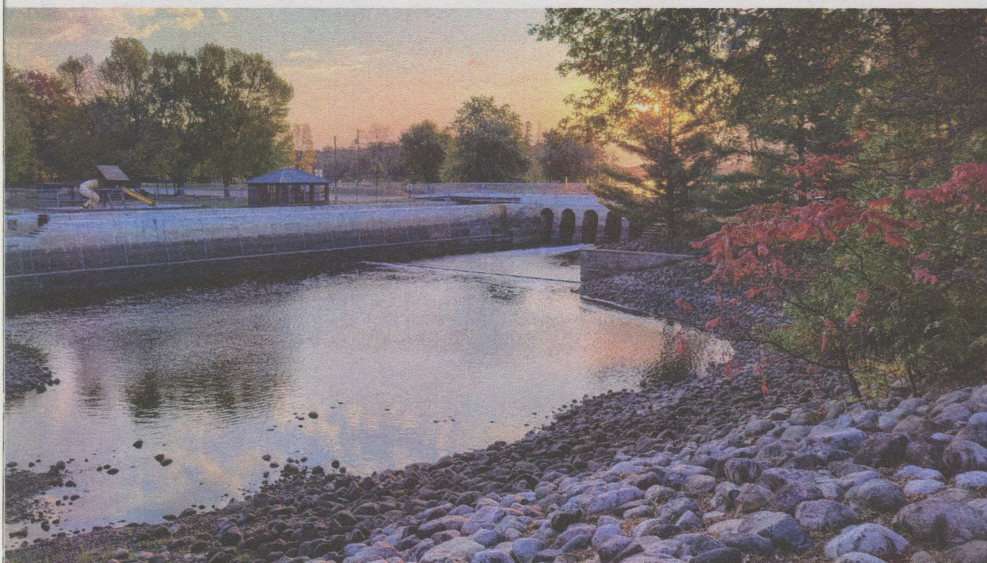
"Nearly all the material we dredge in the St. Louis District is kept in the water. Last year the District did place one million cubic yards that were considered beneficial use to create ephemeral islands to mimic a meandering or dynamic river environment."

The *Potter* motors past its results day and night—whether it's the birds flocking around an island created by its dredged sediment or a tow chugging safely through the channel. That alone keeps morale high.

"When you are working in an office or warehouse you don't see the direct impact of your work," Engel said. "The guys on *Potter* know they are supporting the nation's commerce and industry. They see every tow boat going up and down the river and know that had an impact in helping that boat." —R.S.

Play where it all began

The six headwater dams that created the country's first reservoir system now welcome visitors for fall colors, wild rice harvests, camping and more.



As September shortens, the days and native grasses deepen to golden hues, canoes glide quietly through the shallows of lakes and rivers by Northern Minnesota's U.S. Army Corps of Engineers campgrounds and recreation areas.

Harvesters along the shores of Lake Winnibigoshish, Leech Lake, and Sandy Lake pole through beds of wild rice. They use a sweeping motion with wooden ricing sticks to gently arc stalks over their watercraft and tap them to release ripe grains into the hull. Those grains can be parched, cooked and savored throughout the long winter.

Wild ricing, which begins in mid-August and runs into September, is as much spiritual as it is practical—a connection to the land and its gifts—especially for families with Ojibwe culture.

The tradition of gathering nature's gifts, which include fish, birds and animals through fishing and hunting, often passes to multiple generations of families who gather at the Army Corps' Mississippi River headwaters sites as summer camping winds down.

"We also get a lot of folks chasing the fall colors," said Jeff Cook, operations manager for the Pokegama Dam and Winnebigoishish Lake recreation areas. "The colors are absolutely gorgeous."

First reservoir built at Lake 'Winnie'

The Army Corps began building Lake Winnibigoshish Dam in 1881, followed by the construction of Leech Lake Dam, and then Pokegama Dam. The first ones were finished in 1884 and additional dams were built at Big Sandy Lake by McGregor, Cross Lake at Crosslake and East Gull Lake in Brainerd.

"It was the first reservoir system of dams and lakes in the nation," said Tammy Frauenshuh, natural resources planner for the St. Paul District's recreation and natural resources branch.

The intention of those dams was to raise water levels of the Mississippi River downstream during the dry summer months, especially in Minneapolis and St. Paul where it provided a vital transportation route. By the 1930s, though, the Corps' creation of a 9-foot navigation channel along the Mississippi River offered a better solution.

"Now we push the recreation—the boating, fishing and canoeing down the river," Cook said, along with flood reduction control.

Fishing draws visitors year-round

Fall fishing fires up from late September through early October when fish are active and biting, and hunters also are on the water, along the shore or in the forests seeking birds such as ducks, geese and grouse. Cold weather requires shutting off water and closing campgrounds by mid-October, but day visitors park at Army Corps sites for activities such as deer hunting and ice fishing as lakes begin freezing.

"It's basically a second town with so many folks going out there," Cook said of Lake "Winnie" once it's frozen. "It's one of the most fished lakes in the state because of the walleye."

Frozen lakes also buzz with snowmobilers who use regional networks of trails, and by late January, Gull Lake boasts the world's largest ice-fishing contest in Brainerd.

River paddlers return after ice melts

After the snow and ice melt, groups start showing up for trip-of-a-lifetime adventures paddling the entire Mississippi River. They follow as it winds narrowly through remote wilderness and across lakes through 680 miles through the state on a of northern Minnesota to the Gulf.

"I've met people from all over the world going down the Mississippi," Cook said, and they often appreciate how wild it is with bald eagles perched overhead, otters, deer and other creatures along the shores. "We see the river differently up here."

Winnie Dam Campground, Deer River

Surrounded by the Chippewa National Forest and the Leech Lake Reservation, the 22-site campground fills quickly with fishing enthusiasts seeking walleye, muskies and large perch, as well as ducks and deer in the fall. Campsites are within walking distance of the Mississippi River as it exits the 58,500-acre Lake Winnibigoshish.

Cross Lake Recreation Area

The 122-campsite recreation area sits in the heart of Crosslake, a resort town where gift shops, ice cream cones and events can be easily reached by foot. Visitors hop onto the 54-mile Paul Bunyan Scenic Byway for fall colors, and the new National Loon Center should open in 2026.

Pokegama Dam Campground

These 22 campsites just outside Grand Rapids along the Mississippi River offer access to numerous lakes, in-town attractions such as the Judy Garland Museum, a children's museum and Tioga Recreation Area with mountain bike and hiking trails through former mining areas.



Big Sandy Lake, McGregor

This 60-site campground sits on Big Sandy Lake's northern edge near the Savannah Portage, a pre-Colonial trail that allowed travelers from the St. Louis River and Great Lakes to carry watercraft to the Mississippi River and continue paddling northwest or south.

A former lock house is a small museum with Native American exhibits, and a memorial commemorates the Sandy Lake Tragedy, when Great Lakes Ojibwe families were told to journey here in late October 1850 for government annuity payments and succumbed to harsh weather, starvation and illness.

Each July, the Mikwendaagoziwag (which means "They Are Remembered") recognizes the tragedy with a paddle across the 6,100-acre Big Sandy Lake, followed by a feast and ceremony.

Leech Lake Campground, Federal Dam

This 78-site campground draws experienced anglers and wild ricers who explore the many bays of the third-largest lake completely within Minnesota's borders. It comprises more than 103,000 acres, more than 200 miles of shoreline.

Gull Lake Recreation Area

This 39-site campground sits north of Brainerd where visitors head onto the Gull Chain of Lakes, one of the most popular lake destinations for Minnesota vacationers. It buzzes with fishing boats and pontoons, sport boats and personal watercraft until ice houses take over for the winter. —L.M.M.

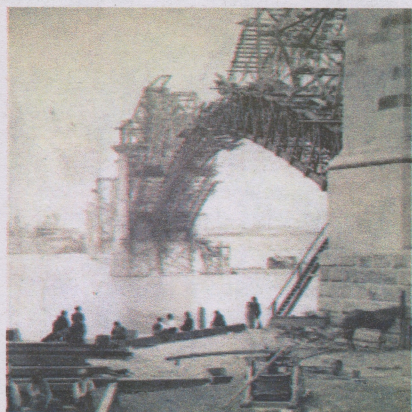
Haunts bring history to life

Ghost tours—and lore—capture fascinating chapters in the Mississippi River's past

The Mississippi River was home to many chapters of the country's past, and haunted tours let you mingle with those who lived through this history—or at least the guides that bring those tales to life.

At Quarters One at Rock Island Arsenal on Arsenal Island, for example, you may catch a passing glimpse (as some swear they have, especially during regular Halloween tours) of soldiers, long dead, who defended the river. Elsewhere, the legacy of slavery—and bravery of those who sheltered slaves on the Underground Railroad come to life.

"The Mississippi is the central vein of our country," said Troy Taylor, an author of numerous ghost books and the founder of American Hauntings ghost tours in Alton, Ill. "All this history has left a mark."



The Eads Bridge of St. Louis

There's a cat colony next to the Eads Bridge—the first to scale the Mississippi and the world's first steel-truss bridge able to carry a railroad. And that there are always 13 cats—even if one leaves—is part of the spooky lore.

Eads, a self-taught engineer and member of the first Mississippi River Commission, insisted in 1867 on building spans out of steel, requiring piers to bedrock 123 feet below the surface. The tragedy was that workers (who may haunt the bridge) sometimes emerged from the river's depths experiencing caisson disease or decompression sickness—what we

now call the bends—and more than 900 became ill, said Jennifer Elwyn of St. Louis, author of "Historic Haunts of St. Louis." Thirteen men died.

The Town That Disappeared

Elwyn hails from the first state capital of Illinois that's currently at the bottom of the Mississippi River. And it may be because of a curse.

Kaskaskia sat on the east side of the Mississippi, founded first by Native Americans and then settled by French fur trappers. Stories contend that when a Native American boy fell in love with a trapper's daughter, the father wasn't pleased. He tied the boy to a log and threw him in the river. As the boy was going

down the river, he yelled a curse that said the dad would sleep with the fishes, Elwyn said. Over the years, Kaskaskia repeatedly flooded and a bad deluge in 1881 cut a channel and shifted the Mississippi eastward.

Mississippi's 'most haunted' house

The McRaven House in Vicksburg is nicknamed Mississippi's "Most Haunted House." But while it's attracted numerous paranormal researchers over the years, the mansion owns unique history, as well. The home was constructed in three sections at three different times, resulting in its other nickname of "Time Capsule of the South."

Tour guides Thiscontend that original owner Andrew Glass, known for robbing travelers along the Natchez Trace, haunts the back section. The ghost of William Murray, who purchased the home in 1882, prefers the front of the house, according to Alan Brown, author of "Haunted Vicksburg." And then there's Mary Elizabeth Howard, wife of a former sheriff, who died after giving birth. Weird things happen on a regular basis in the room where Elizabeth passed.



Alton, Illinois

Visitors flocked to Alton's Mineral Springs Hotel at the turn of the 20th century hoping the sulfur-infused waters would cure what ailed them. But it changed over the years, author and ghost guide Taylor said, and some hotel residents have refused to check out. One is said to be L.M. Harwood who shot himself in the hotel bar when the waters failed to cure him of his alcoholism. A male apparition has been seen haunting that area. A woman frequents the second-floor staircase accompanied by a smell of jasmine perfume. For years, everyone called her the "Jasmine Lady." One visitor related how his Aunt Pearl (who smelled of jasmine) disappeared after visiting Alton.

Some have chalked up Alton's frequent hauntings to the limestone bedrock, but like other river towns, it also saw its share of murder and death. —C.C.

My MISSISSIPPI



Brenda Kelly, Wildlife Biologist with the Wisconsin Department of Natural Resources, La Crosse, Wisconsin

Brenda Kelly, who has maintained lifelong roots along the Mississippi River and who is an avid angler and hunter, is a wildlife biologist with the Wisconsin Department of Natural Resources and works out of the agency's La Crosse, Wisconsin, office. Each year she leads a paddling trip, Paddle the Big Muddy: A Meander through the Backwaters.

"I do a standard paddling trip one time a year. A lot of times, especially with adults, I'll ask, 'Who has paddled on the Mississippi before?' No one will raise their hand. When I ask, 'Why not?' I hear things like the river is too scary. It's so big. It's muddy. It's the Mississippi. It's dangerous.

"I lead them into the backwater and they find it's not as scary as they thought. My trips are about connecting to and learning about the resource. We stop next to a beaver lodge and talk about river mammals, and then there's the bird diversity and our national icon, while we are in close proximity to an eagle's nest. It's amazing how many people have never experienced an eagle fly by or witnessed the magnificence of a nest.

"The tour provides them with the tools they need to come back, to throw their kayak or canoe on their vehicle and return. People are so thankful. They'll say, 'Thanks for opening my eyes to this beautiful resource.'

"My job is varied and I spend time both inside planning and outside on the resource. My role is to protect and manage the wildlife resources of the Mississippi River with our partners and for the citizens and communities of the area. That can mean helping restore vegetation beds for waterfowl or assisting other programs tagging sturgeon for a research project or meeting an annual assigned banding quota for Canada geese. There's nothing like rallying a crew of like minded conservationists to round up geese, learn more about them and assist with a banding effort. It's something I look forward to each year.

"One of the benefits is that this type of work connects you back to the ecosystem and the people and you realize the opportunities along the river are endless. It's so dynamic. You lose yourself. It gets in your soul. At the end of the day, I am so fortunate to have this job and contribute towards work on this great resource as well as with great people within the partnership."

Prairie Perfect

OUR MISSISSIPPI KIDS

Riding down the typical Midwestern highway, you'll see so many cornfields that you might think the landscape always looked this way. But it didn't. Until European settlers arrived, much of the Midwest and Great Plains were prairies covered with grasses and flowers.

Picture prairie grasses that reached 10 feet tall! Now, just 4% of the original tallgrass prairie remains, because the land was cleared for crops and cities. Animals that roamed the area, such as bison, elk and wolves, are mostly gone. But government agencies and private groups are trying to bring the prairies back in some places.

Remaining prairies are home to hundreds of species. Native prairie plants resist drought and disease. Their deep roots filter out pollutants and prevent erosion. Prairies are "one of the most biologically diverse habitats on the planet," said Doug Gorby of the U.S. Fish and Wildlife Service.

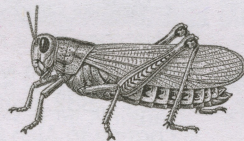
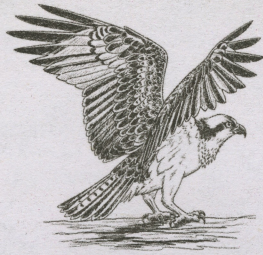
At the Riverlands Migratory Bird Sanctuary in West Alton, Missouri, the U.S. Army Corps of Engineers demonstrates how it is restoring 1,200 acres of prairie wetlands. The project could become a model for rebuilding similar prairies elsewhere, said Tyler Goble, an Army Corps biologist.

Crews plant native grass seeds such as bluestem and switchgrasses. Scientists also grow rare prairie plants in a Riverlands greenhouse, and this fall volunteers will place about 6,000 in the ground. Workers also remove invasive plants that compete with natives. They set controlled fires every few years to clear away unwanted vegetation—one special circumstance where fire can be beneficial.

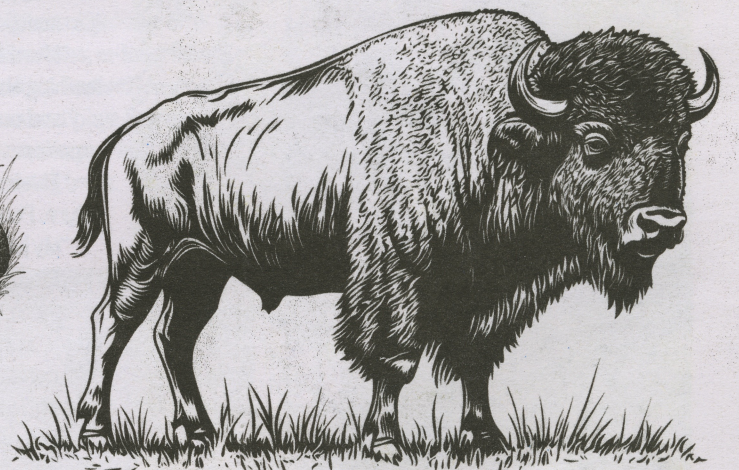
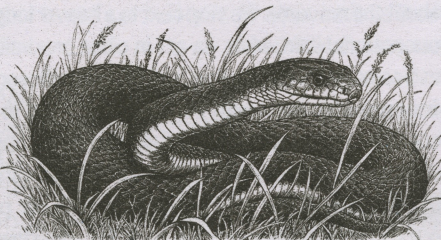
Some unique habitats being built at Riverlands may no longer exist elsewhere, Goble said, but the goal is to establish them for pollinators and birds. One rare ecosystem the scientists are building is a sand prairie, which is a type of grassland that grew from fine silt left behind after Ice Age glaciers pulverized the landscape. Army Corps biologist Chad Harrison said that scientists formed the sand prairie at Riverlands with river deposits and sediments dredged from the river. The team hopes to link it with other sand prairies in the Mississippi floodplain to provide habitat for endangered or threatened animals.

The Army Corps partners with other agencies to restore and protect native prairie. One organization bringing them together is the Upper Mississippi-Great Lakes Joint Venture, which focuses on bird habitat. Migratory birds that rely on grasslands have declined sharply in the past 30-40 years, said Gorby, who coordinates the joint venture. Pollinators and various mammals that once thrived there are suffering, too. Prairies are also good for people—for birdwatching, hiking, hunting and camping. So, let's explore!

Can you seek out these prairie creatures?
Each picture of an animal or insect is represented by its name in the word search

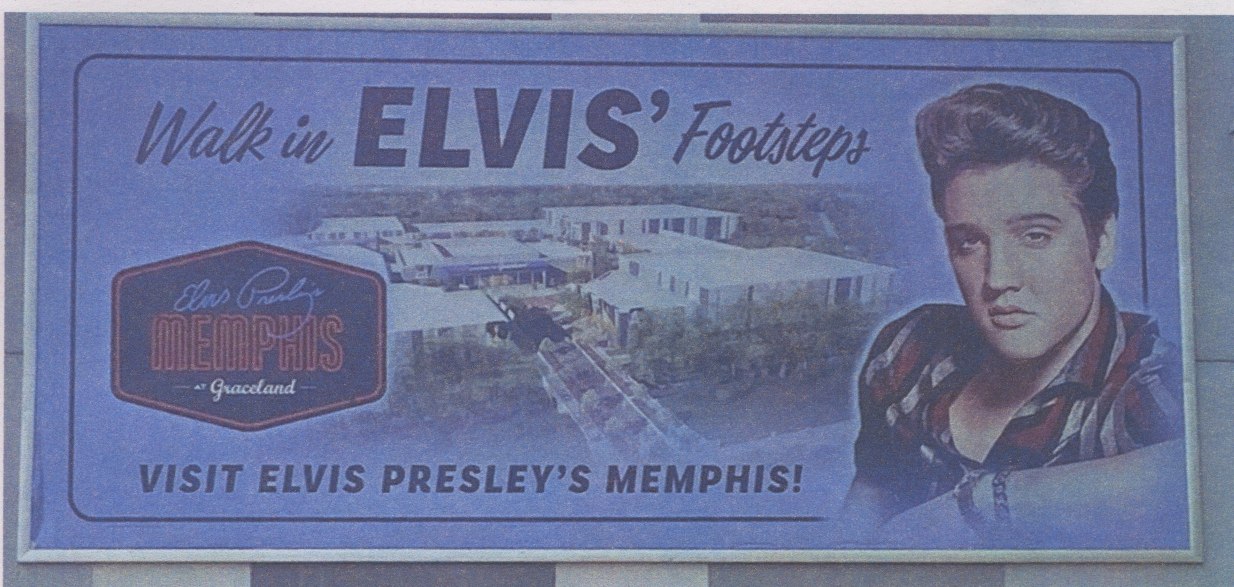
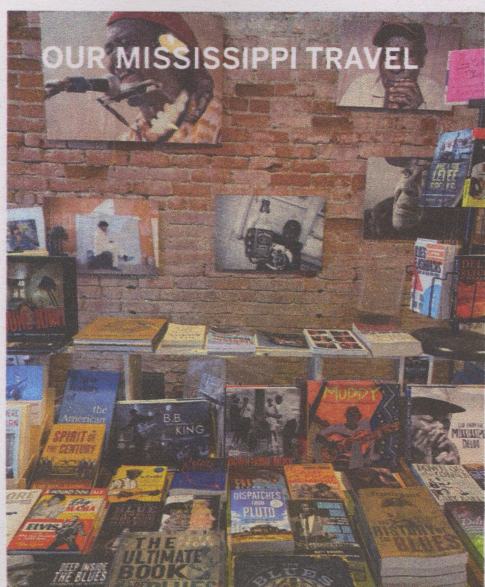


G R A S S H O P P E R Z Z G G N
C K S N A K E Y P U Z N Y R X T
X C G U O K U N R E L B U T X B
W R N S D O R A E E I V K I J U
C E R J W L E B S C W K K X T T
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B A D G E R F P J X E H S Q N I
W H I T E T A I L E D D E E R N
K S C Z V T L D N K B B K R C K



Word List: Bison, PrairieDog, Butterfly, Bumblebee, Vole, WhiteTailedDeer, Elk, Fox, Badger, BlackBear, Hawk, Snake, Grasshopper, Mink or Weasel

U.S. Army Corps of Engineers, Mississippi Valley Division



River Rhythms: A Musical Trip Down the Mississippi

Follow the Mississippi River south from St. Louis to New Orleans, and you'll find more than mighty waters and scenic vistas—you'll find the roots of American music. Along its levees and back roads, in vintage halls and smoky clubs, a river of sound has flowed for more than a century: ragtime, blues, jazz, rock, and soul. Each city along the way holds a different rhythm, shaped by its people, its past, and its place on the map. This is a journey not just of miles, but of melodies.

St. Louis, Missouri: Ragtime's Riverfront Start

In St. Louis, the journey begins with syncopation. Around the turn of the 20th century, this bustling river port was the heart of ragtime music, and none played it better than Scott Joplin. His lively, intricate piano compositions, which include the "Maple Leaf Rag" and "The Entertainer," earned him the title of King of Ragtime.

Today, you can stand in the parlor where Joplin lived and composed at the Scott Joplin House State Historic Site, a modest brick row house that hums with history. Then head downtown to the National Blues Museum, where exhibits trace the genre's roots and lasting legacy. Next, board a riverboat for a music cruise, drifting past the iconic Gateway Arch while a live band brings the past to life. Finally, head to Soulard, one of St. Louis's oldest neighborhoods, where many restaurants and bars host performers. EXPLORESTLOUIS.COM

Memphis, Tennessee: Where Rock Was Born

About 280 miles downriver, Memphis roared into musical history by fusing blues, country, and gospel into something new: rock and roll. That sound first crackled to life at Sun Studio, where Elvis Presley, Johnny Cash, and Jerry Lee Lewis stood before the

mic. The studio still welcomes pilgrims eager to hear those echoes.

Long before rock and roll, W.C. Handy—the "Father of the Blues"—was laying the city's sonic foundation. At his former home, now a museum, you'll find out how Beale Street found its voice.

Elvis fans won't want to miss Graceland, the King's opulent mansion and final resting place. Just a short drive from Graceland in the heart of downtown Memphis, the Memphis Rock 'n' Soul Museum and the Blues Hall of Fame Museum offer immersive journeys through the lives and legacies of the genre's pioneers. And of course, there's Beale Street itself—where music still spills from open doors and the past meets the present in every riff and rhythm. This is Memphis at its most alive. MEMPHISTRAVEL.COM

Helena, Arkansas: Radio Waves and Blues Roots

Just downstream lies Helena, a small Arkansas town with an outsized musical legacy. In the 1940s, KFFA's "King Biscuit Time" radio show broadcast the blues across the Delta, turning Helena into a magnet for talent. Sonny Boy Williamson, Robert Lockwood Jr., and Pinetop Perkins all played here, shaping the genre with every note.

You can still hear the blues broadcast live each weekday at the Delta Cultural Center, where the studio has become both a shrine and a stage. Visit in October to attend the King Biscuit Blues Festival, when the whole town comes alive with music. At any time of year, walk the Helena Blues Trail through the downtown, which has markers highlighting important locations tied to the city's musical history. VISITHELENAAR.COM

Clarksdale, Mississippi: The Cradle of the Blues

Cross into Mississippi and you'll soon arrive in Clarksdale, the cradle of the Delta blues and one of the most evocative musical destinations in the country. Legend has it that Robert Johnson sold his soul to the devil at a nearby crossroads, a story marked by a monument at the intersection of Highways 61 and 49. With live music every night and many annual festivals, the spirit of the blues blazes brightly in Clarksdale.

At the Delta Blues Museum, you can trace the



genre's rise from cotton fields to concert halls. Don't miss the cabin where Muddy Waters once lived, now preserved inside the museum. In the evenings, follow the neon to Ground Zero Blues Club, where the music is live, loud, and proudly rough around the edges. Stop by Cat Head Delta Blues & Folk Art, a hybrid record store, gallery, and souvenir shop run by blues evangelist Roger Stolle. VISITCLARKSDALE.COM

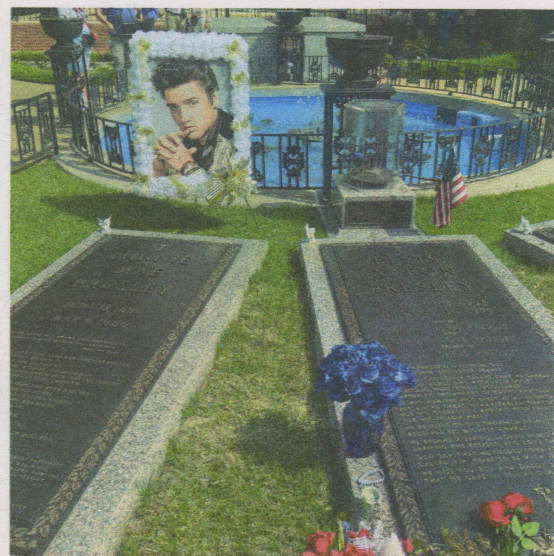
New Orleans, Louisiana: Jazz at the Source

Finally, the river delivers you to New Orleans, a city where music is not just a performance but an entire way of life. Jazz was born here, in Congo Square and Storyville and on the front porches of the French Quarter, shaped by African rhythms, Creole culture, and centuries of improvisation.

Preservation Hall captures the magic in a bare-bones music venue that serves up traditional jazz in a room that feels like it hasn't changed since the 1950s. Nearby, Frenchmen Street offers a nightly feast of musical genres spilling from venues like d.b.a. and The Spotted Cat Music Club.

Don't miss the New Orleans Jazz Museum, located in the Old U.S. Mint. Exhibits trace the genre's evolution and celebrate its enduring influence. But the best soundtrack of all is the one on the streets—catch a second-line parade and you'll understand what it means to move with the music. NEWORLEANS.COM

The Mississippi's current doesn't just carry water. It carries story and struggle, joy and pain, invention and reinvention. Along this river, the soundtrack of America was born, and it's still playing. All you have to do is follow the music. —L.E.





US Army Corps
of Engineers

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Water Trail wins Corps partnership award

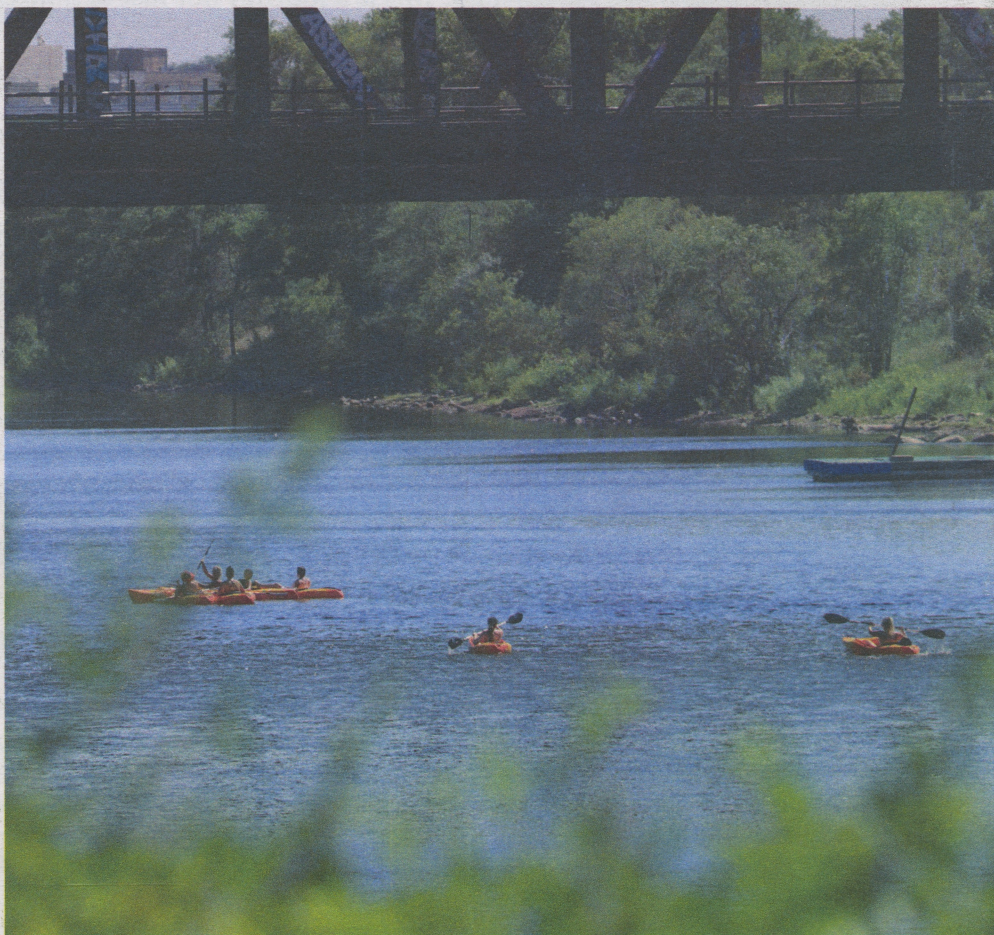
The U.S. Army Corps of Engineers has named the Mississippi River Water Trail Association the winner of its national Excellence in Partnership Award. Only one such award is given out each year, and it recognizes exceptional contributions by a partner who supports Corps recreation and environmental stewardship programs.

The MRWTA is a St. Louis-based group made up entirely of volunteers who are passionate about developing safe recreation opportunities on the Mississippi River. Since forming in 2005, MRWTA has contributed over 20,000 volunteer hours by providing skills training and public paddling events, promoting water safety, picking up trash, and bringing together people and organizations who want to recreate on big rivers and their backwater sloughs. The trail itself is 120 miles long and includes camping spots on several Mississippi River islands and many hidden gems to explore along the way.

The partnership is a blueprint for other volunteers wanting to join around a shared vision, said Katelynn Oreto, Natural Resources specialist with the USACE Rivers Project.

"People often have strong opinions about the river without ever actually getting on or near the water," said. "The Water Trail Association, and the many partnering organizations they've helped bring together, have given thousands of people the opportunity to see for themselves what the river has to offer and hopefully instill a sense of respect and responsibility for its stewardship."

Learn more:
mississippiriverwatertrail.org



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